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Birch,  
L. E.

Guidelines for Effective Control  
of the Rocky Mountain Pocket  
Gopher



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# GUIDELINES

## FOR

# EFFECTIVE CONTROL

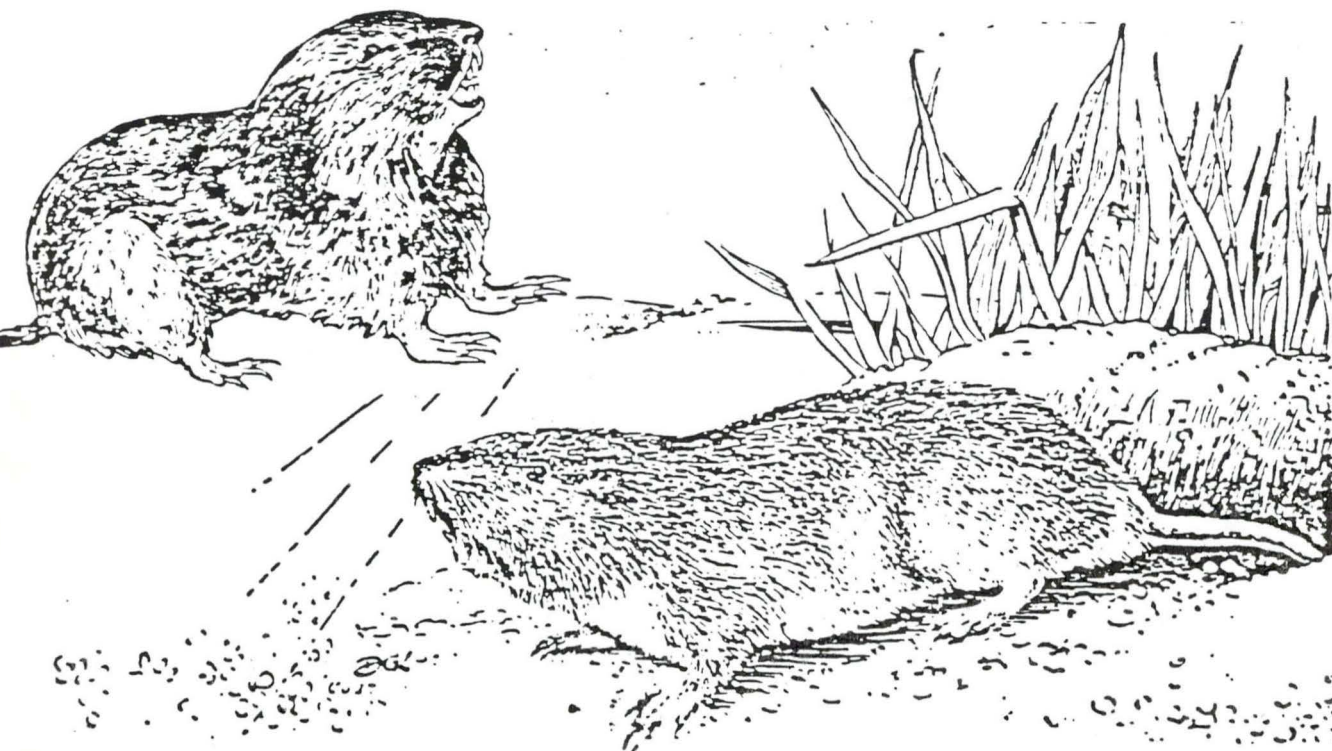
## OF THE

# ROCKY MOUNTAIN POCKET GOPHER

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## ABSTRACT

The Rocky Mountain Pocket Gopher (*Thomomys* spp) has had an impact on reforestation in the Pacific Northwest through damage to plantations. The increased awareness of gopher damage has brought a demand for information on available control of the pocket gopher. The purpose of this publication is to make available contract information obtained and documented on the Ashton District of the Targhee National Forest available to anyone who has a need for pocket gopher control. Special thanks to Victor Barnes and Micheal Anthony of the U.S. Fish and Wildlife Service for encouraging the writing of this paper.

### I. INTRODUCTION

Pocket gopher damage to forest regeneration was reported as early as 1940 but few reports and lack of specific information on types of damage led to almost no control action being taken. In order to understand a pest such as the pocket gopher it is necessary to understand its basic life history; such things as food habits, reproductive potential, home range, longevity and the way that it damages trees. However, because of the underground habits of the pocket gopher this information is not easily obtained by casual field observations. For this reason the view of the pocket gopher is often a simplistic one. The pocket gopher reforestation is analogous to many other forest wildlife situations. The animals are widely distributed in timber stands, meadows and other breaks in the forest canopy where ground vegetation provides ample forage. Openings created by harvest or wildlife, and the successional vegetation that follows, improve gopher habitat and populations with the increased forbs and grass production in clearcuts can increase at explosive rates. (Birch 1977 Garrett Report) and result in high populations in two to three years. On clearcuts not reforested within five years the population buildup without control can destroy a newly planted plantation in three years. (Birch 1977). The three most common form of tree damage are: root pruning, winter casts and a combination of stem girdling and clipping.

In 1974 while reviewing the damage on our District to pocket gophers and the many problems associated with the operation of a 40 man force account crew, the decision was made to contact rodent control starting with Fiscal Year 1975. A pilot project of 900 hundred acres was undertaken using all available information and by constantly reviewing and improving the contract it has evolved into a successful control program with effective protection of our plantations. With constant modification and using proven procedures plus developing and improving unknown practices the contract has grown into what we are using today.

We have finished the 13th year of contract work on our District having provided protection for over 35,000 acres of plantations. Success has been varied but for the majority has been effective. We had an independent study conducted on the District for two years and their control figures were comparable to our own evaluations. These figures are available from the Ashton District Office. The following guidelines are given solely for other organizations to set up their own control



procedures. Each rodent problem varies with soil conditions, topography, labor force, weather, populations and pesticide restrictions in the area. We are giving the basic concepts for contract work and they can in turn be adapted to many differing situations and are given as guidelines only. The basic needs for contract work are: Environmental Assessment (Specifications in Appendix) survey information, training, contracting requirements, good employees, evaluation procedures and a safety program for everyone's protection. With the use of a highly toxic pesticide, safety cannot be stressed to highly along with highly motivated personnel who will make the program work.

## II. PROCEDURES FOR ESTABLISHING CONTRACTS

### A. Surveys of rodent activity and damage.

1. The District or area should be stratified using a three color map showing light, medium and heavy gopher population areas. This can usually be accomplished by using people who are making stocking surveys. Some training in recognizing pocket gopher sign usually gives the needed information.

2. Surveys can be made anytime of the year that the gopher is active or producing evidence that he is in a certain area, i.e. push piles, earth plugs winter casts, plant clippings and damage to small trees.

3. Prior to making a decision to apply poison grain in an area, a pre-season survey should be conducted on a sample basis to make a decision for implementing a baiting project the following year. This should be done when the most gopher evidence is showing. Representative units would be randomly selected and sampled at the following standards to determine if treatment is necessary.

a. A two percent sample would be made for each selected unit using a grid system. The unit for sampling would include the buffer area surrounding each unit, i.e. this buffer area is 60 feet wide in timbered areas of the boundary of the treating unit and 120 feet in all others.

b. Number of plots showing current years gopher activity would be recorded to determine plot occupancy.

c. Activity per plot would be estimated by a quick ocular method on each point and rated within the following three intensity classes;

1. light activity is two evidences found per plot.
2. medium activity is three to five evidences per plot.
3. heavy activity is over six evidences found per plot (plot is 1/100 acre and instructions on plot taking are listed in the appendix)

Recent activity is defined as any visible evidence produced by the pocket gopher i.e., winter casts, push piles, earth plugs, or plants clipped by the gopher. This survey can be recorded on the survey forms listed in the appendix and then transferred to the four year form to watch buildup activity. If succeeding surveys show a buildup of activity this will indicate a need for treatment. From the data collected and guidelines stated in Section 1322 of FSH 2609.22 dated 7/84 a decision for treatment can be made. The same system could be used in making surveys for burrow builder treatment. All succeeding treatments (2nd, 3rd, etc.) should be determined by the same process. This information is necessary and should be maintained for proof of need to apply a restricted pesticide to control the pocket gopher. EPA has rendered a decision that bait in the burrow system of the gopher with strychnine does not represent potential impact to non-target animals that above ground application posed, (Nov. 17, 1983, Pesticide Use Advisory Memorandum No. 347). Detailed survey instruction and forms are listed as Exhibit A in the Appendix.

#### 4. Maps and Acreage Determination.

As in any contracting work maps are an integral part of the contract. When laying out potential treatment areas take advantage of natural barriers i.e., streams, roads, etc. The boundary treatment of 60 feet in timber areas and 120 feet in all others is recommended to prevent rapid reinvasion by the gopher. Smaller clearcuts can be completely reinvaded by the next year if effective buffer areas around the clearcuts are not treated. Maps prepared at 4 inches to the mile give excellent boundaries to measure with the planimeter. The formula for acreage in the perimeter on 4 inch to the mile aerial photos is measure the boundary with the planimeter in inches x 1320 feet x the perimeter width (60 or 120 feet) divided by 43,560 square feet in an acre gives the perimeter acres to be treated. Do not exclude timbered areas or rocky sites as the gopher will inhabit these. Do not treat closer than 100 feet to any water with the poison bait. On the back of the inspection form we suggest a map may be drawn of the units and the inspection plot marked with an X and the open hole plot marked with an O to help in finding the plots later.

#### 5. Perimeter Treat

1. The survey and open hole work on the Ashton District show a reinvasion on the edge of clearcuts and planting areas. We have made a part of the contract treatment of this 60 foot extended area in timbered lands and 120 foot area in any area bordered by meadow land or a natural opening.

2. Overall, on a contract, the perimeter treat will be approximately 15 percent of the acreage of the treatment blocks.

#### B. Contract Guidelines and COR Information

1. Keep rodent control contracts in the 700 to 900 acre range for higher quality work.



2. Crew size at nine with a working foreman and maximum size of twelve with two checkers.

3. Contract hours to remain the same - 6:00 a.m. to 2:30 p.m. with 1/2-hour lunch break.

4. Stop treating after rain for 24 hours if over .25 inches have fallen.

5. Use high quality people for inspection.

6. Train extra people for inspectors in case of emergency.

7. Eight hours of training for inspectors with a trip to the field and actual practice in making acceptable sets, inspecting the sets, and recording on inspection sheets. Drawing map of treating block on back of inspection sheet and putting inspection plots and open hole plots on it. Marking and establishing the open hole plot.

COR information:

1. Become familiar with the contracting administration policy, 1974 Handbook 6309.11, also the R-4 handbook.

2. Contracting planning and preparation: 90 days is the minimum time allowed for implementing contracts.

- a. Advertise for 30 days
- b. Labor and rates
  - (1) service contracts
  - (2) construction - Davis and Bacon Act

3. Pre-bid and meeting, if necessary.

4. Prepare 6300-4 - Request for Contract Action.

5. Small Business Administration - minority groups are to get a percentage of contracts.

6. Pre-work conference will be held for each contract. This is a must. Those who are to attend this meeting:

- a. CO
- b. COR
- c. Contractor or representative
- d. Inspectors
- e. Secretary

Documentation of this meeting shall be made and put in the contract file.

7. Contract administration forms used:

- a. Proposed progress schedule. Contractor's responsibility is to be sent to Forest Service within ten days.
- b. Contractor's evaluation form. To be filled out by the COR after the contract is completed.
- c. Contractor's representative form.
- d. Notice to proceed.
- e. Work orders in alphabetical sequence.
- f. Change orders in numerical order.
- g. Inspector designation form. Copy to be given to inspector, contractor, CO, District Ranger.

8. Contractor will pay equivalent wages to his employees.

9. Closing contract:

The COR must:

- a. Sign contract release
- b. Make final inspection and acceptance
- c. Justify final payment

C. There are two ways of handling the furnishing of the bait, 1) we can handle it ourselves and make sure it is fresh or (2) have the contractor furnish it and give us an affidavit that the bait is fresh and has adequate toxicity levels. The contractor should also furnish the probes, jugs and ribbon or equivalent paper to cover sets. We must control the poison bait in the field to prevent damage to the environment.

### III. TRAINING

Training should be given before the start of the treating season and should include the actual digging of a gopher system to acquaint personnel with pocket gopher habits and how control work needs to be done. The actual inspection procedure will be given in the next section. In the appendix listed under Exhibit B is a typical training agenda and all personnel should become familiar with the contract inspection procedures and safety.

#### A. Government-Furnished Property and Services

The Government will furnish sufficient poisoned oats with strychnine alkaloid poison (0.5 % strychnine alkaloid poison), and cans with locks for its storage and safe keeping, on a daily basis for the contractor's use. Contractor furnishing bait has been discussed before.



## B. Contractor-Furnished Property and Services

1. To comply with Idaho State law covering handling and application of pesticides and to assume full responsibility as outlined under safety on page of this report, one person and one alternate will be designated to receive the poison grain daily from the Forest Service. This (these) individual(s) will be responsible for distributing the grain in containers to the crew members.

2. Metal probes. These probes should be 5/8 inch in diameter by three feet long with a two-inch point - one for each crew member to make proper sets.

3. One-inch bright colored ribbon or its equivalent as approved by the COR to mark bait sets.

4. A narrow-mouthed container with handle (one gallon or less) for each crew member to carry the poison grain in. Also, a funnel to fill the bottles.

5. All other miscellaneous supplies and equipment necessary for successful completion of the work.

6. Gloves for all crew members handling poison grain.

7. Gloves, dust type (mouth-nose) respirators and coveralls for those individuals designated to dispense grain.

8. Soap, water, and salt tablets will be provided by the contractor.

## C. Procedure to Make Proper Sales

Baiting should be conducted during or just after mound building activity is at its peak (usually mid to late summer). Timing of baiting is critical to successful baiting and activity peaks should be identified carefully.

Northern Rocky Mountain pocket gophers live in territories or a burrow system that is 30 feet or longer on the long axis. These territories range from only a few feet to several feet wide. All territories within the contract are to be treated with acceptably places poisoned sets. A gopher territory will be shown by the Contracting Officer's Representative on the first day of work.

A pocket gopher's territory (system) is comprised of main runs, feeder runs just under the soil surface, lateral runways, food caches, nests, push piles and earth plugs (dollar-sized). See Exhibits D and E.

Poisoned sets in the main runways are difficult to define and are the only sets relatively certain to kill pocket gophers and are the only sets that will be acceptable.

A gopher system can be seen above ground by earth plugs and push piles. A push pile is a mound of soil that is often kidney shaped. When intercepting a system, the crewman should probe for a main runway. Probing in a line between two fresh mounds or within two feet of any one mound will often times intercept the main runway. When probing, a lessening of friction will be noted when the probe drops into the main runway.

Only poisoned sets in relatively fresh or recent gopher activity will be accepted.

Main runways are found at two soil depths. During the spring and after heavy rain storms, the main runs will occur within six inches of the ground level. After extended dry periods, the shallow six-inch runways occur about 6-18 inches in depth.

When the main runway is located, the probe hole should be slightly opened. Approximately a teaspoon of oats (10 to 15 kernels) should be poured into the hole. Care is necessary to not collapse the hole which would result in covering the grain with soil. After putting the poisoned grain in the runway, the hole will immediately be covered by a small rock, pine cone, or clod of dirt. The objects used to cover the probe hole will be covered with loose soil. This poison "set" will be marked with a piece of flagging approximately six inches long weighted down with a stick or rock. The flagging will be placed immediately above the location of the poison set. Enough ribbon will be left exposed to be readily visible to the inspector. Marking poisoned sets is essential as payment is based on properly made poisoned sets identified by flagging. Paper type may be used at the direction of the COR.

If grain is accidentally spilled while setting a gopher system, the spilled grain will immediately either be buried or put down the gopher hole.

The inspector will work right behind the crew or even with them and pick up immediately any problems. Take inspection control plots and set up open hole plots with yellow and red flagging on wire. Inspection plots one per six acres and open hole plots established on per ten acres.

Pursuant to Part A - General Provisions, Clause 13, of Form 6300-38, the Government will inspect gopher control sets to determine the acceptability of the set and for the purpose of computing the rate of payment. A minimum of one percent of the area will be inspected for compliance. Inspection is by inspection units and is listed under Section 122. Each inspection unit stands on its own for payment or



rejection. For inspection purposes the following is given: evidences winter casts, push piles, earth plugs, open runs or plants which have been clipped by the gopher.

The gopher control blocks will be surveyed systematically using 1/15th acre plots (30.4 foot radius). The inspector will travel with the treating crew until gopher activity is intercepted. A point will be randomly selected as the center of the inspection plot. The inspector will then look for flagged poisoned sets. Four or less evidences (push piles, earth plugs, etc.) suggests light activity and requires two good sets, not less than four feet apart. Five to seven evidences suggests medium activity and requires three good sets, no less than four feet apart. Eight to twelve evidences suggests heavy activity and requires five good sets no less than four feet apart. Thirteen or more evidences is extreme activity and requires seven good sets, no less than four feet apart.

During the inspection procedure of a plot, when the inspector reaches the required number of good sets for that plot, it is not necessary to dig any more sets for contract compliance. The inspector will list the number of good sets in the plot on the inspection form, i.e.: 2, 3, 5, 7.

A copy of the inspection form is attached in the Appendix Exhibit C.

#### E. Equipment Needed by Forest Service Inspector

1. Pickup
2. Garbage cans with locks and plastic bags
3. Shovel, probe, plot string and ribbon (two colors)
4. Gloves
5. Water canteen
6. First aid kit
7. Forms, pencils, clipboards
8. Maps, overlays, copy of contract
9. F.S. key
10. 36 inch wire tags to mark open hole plots

#### F. Safety

The rodent control contract is divided into two categories: the hand control contract and the burrow builder contract. Safety for both will be covered in this plan. The two contracts call for the designated inspector to be on the job when the contractor is working. these contracts are using a .5% strychnine alkaloid poisoned oat for bait, giving us the responsibility for safety and accountability at tall times. The rodent control project consists of walking over the last two years tree planting areas and searching for the gopher's evidence, using a metal probe to find the runway, and putting the poisoned bait in the main burrow and covering the hole. The burrow builder contract will use a small crawler type tractor to which is attached the Forest Service

burrow builder and it will be pulled through the ground in the last two year's plantations. It constructs a burrow and deposits a small amount of poisoned grain every five feet.

Safety is covered in detail in Exhibit F in the Appendix.

G. The forms that have been developed over the years and are used on the Ashton District are listed below and also examples in Appendix Exhibit C.

1. Annual Survey Form
2. Four-Year Survey Form
3. Inspection Sheet
4. Grain Care and Safety Form
5. Open Hole Form
6. Burrow Builder Form

#### H. Production Rates and Inspectors Needed

The pilot project started in 1975 averaged 40 to 50 acres per day for the treating crew. In 1976, the first year treat averaged from 15 to 50 acres per day, and the second year treat averaged from 40 to 70 acres per day per crew.

In 1977, the first year treat again averaged from 10 to 40 acres per day. The second year treat averaged from 50 to 90 acres per day.

We are now getting experienced contractors with some returning crewmen that have experience. An incentive program established by one contractor in 1977 has greatly improved production. Basically, he estimated the days of work it would take a normal crew and told them if they could cut this time, he would pay for the estimated time. Example: a 500 acre contract would take a ten man crew ten days to complete. If they worked hard and finished in eight days with acceptable work (90% or better inspection so contractor would get full payment), he would pay them for the ten days. This really moved his crew along. We are now requiring two checkers to follow crew and catch any missed areas.

We recommend a crew size of nine people with a working foreman. Two Forest Service inspectors can keep up with this size of a crew. The working hours of 6:00 a.m. to 2:30 p.m. are working well. The fresh gopher sign is much more evident in the early morning hours.

There are many things that effect production of crew: gopher activity, weather, temperature, etc. The clearcuts can be extremely hot on certain summer days and this does have an effect on the production of the crew.

The prework conference with your contractor will probably go farther in accomplishing your goal than any other action you can take. I recommend your inspectors be at this meeting so that everyone clearly understands what is to be done and how the work is to be inspected. This



is one of the weak areas of our work and needs to be reinforced at all levels of administration from the contracting officer to the inspector. If we can make the inspector part of the work plan and the Contracting Officer understands what we want done many problems will be eliminated.

Can you understand the frustration of a young inspector who has no training and is put in the field with a contractor whose major goal is to cover as many acres as possible. We sometimes place people in very awkward and stressful situations. Again I stress training, it will pay big dividends in many ways. A typical training agenda is available from the Ashton District. Rodent control work plans are listed in Appendix D.

#### IV. EVALUATION PROCEDURES

The open hole technique (Barnes, 1970) is being used with some modification to assess the success of our control work. The weakness of the open hole techniques is that it assumes single occupancy of each burrow system. We know from past experience that we are getting some reinvasion during the 16 days we wait to read the open holes. Following is the open hole evaluation system used on the Ashton District to determine our control effectiveness.

A. Objective: The objective of this survey is to determine the reduction in pocket gopher activity that occurs after operational control programs. This will lead to accurate damage predictions in subsequent years.

B. Procedures: The open hole technique used on the Ashton District over the last ten years is used to assess the effectiveness of our contract pocket gopher control. This test is based on two traits of pocket gophers. They will plug any opening of their burrow system in a relatively short time and they are solitary animals generally, resulting in one animal per burrow system. The weakness of the open hole technique is that it assumes single occupancy of each burrow system. This technique differs with ones developed earlier (Miller, Richens, Barnes) in that we are not able to establish plots prior to treatment and we put the plot near fresh gopher activity where a contractor has made acceptable sets.

Basically we are interested in the control established by the contractors' work. We realize we will have reinvasion by gophers from adjacent untreated areas as soon as a burrow system is vacated, but we are primarily interested in the control in the planted area; plus the 60' or 120' perimeter treat, which is 60 feet in timbered areas and 120 feet in all other areas from the last row of trees or scalps planted.

Following is the schedule of our open hole evaluation program:

1. The open hole plot will be established by the Forest Service inspector when working with the contract crews. Plots will be established in the following sequence: Three plots will be established in each treating block from one to thirty acres in size. In blocks over thirty acres, there will be one plot established per ten acres with the following distributions: one-third of the plots will be established in the outside 100 feet of planted scalped areas. The remaining two-thirds will be established in a systematic manner over the remaining center of the treatment block.

2. The plot will be established by the inspector putting up a 6' stick with 36 inch yellow and red ribbons tied to the top so that the plot can readily be found later.

3. Sixteen days after treatment and establishing the plots, they can be opened. The grain becomes unpalatable in approximately 14 days and the probability of any control after 16 days is minimal. Find the burrow system, dig out approximately one foot of the runway and leave both holes of burrow system open. Lay a two foot piece of one inch flagging through the hole and hold it down with a small amount of dirt. if the hole is not identified well, the gopher could close the holes with a large push pile and you will not be able to tell where the plot is. Two days after opening the system, return and record on the plot sheet whether the holes were open or closed. If one side only is closed, it is still a closed plot.

4. If hole is closed reset system with poison bait to remove the gopher.

5. In summarization of the open hole technique statistics: take the total acreage in each block divided by the total acres in the contract, which gives the percentage of total area. This figure times the percentage of closed holes equals the closed percentage weighed to the total acres. These figures totaled by blocks for each contract equal the closed hole percentage. Subtract this from 100 percent and this gives the control percent.

Example:

Total Contract Acres = 500

Block      Acres

1	90	90 - 500 =	0.18	x .33 =	0.06
2	110	110 - 500 =	0.22	x .00 =	0.00
3	200	200 - 500 =	0.40	x .14 =	0.06
4	15	15 - 500 =	0.03	x .21 =	.006 or 0.01
5	85	85 - 500 =	0.17	x .04 =	.007 or 0.01

Total 0.14  
100% minus 0.14 = 0.86%



## V. BAIT INFORMATION

The tests that were completed on the Ashton District in Fiscal Year 1986 have shown the need for further pocket gopher research on the efficacy and attractiveness of the bait to increase control. The high variation in the strychnine levels of the different baits and the high level of strychnine in the fines of the bottom of the containers has shown the critical need for research on keeping the strychnine on the bait until it is placed in the burrow system. The trials have shown the importance of correct bait handling from the PSD to the sets in the gopher system. The oat groat with Karo syrup appears to have given the least sluffing of the strychnine from the bait and the least fines left in the containers.

The difference in the effectiveness of the two shipments of Orco has shown a higher toxin level helps with control but with the oat groat successful control was obtained with slightly lower toxin levels which indicate lower levels may be offset with other factors such as efficacy and palatability to the pocket gopher.

The levels of strychnine on the bait are so variable they make a control program impossible to make effective if all the factors that affect control are not watched closely. The effectiveness of the bait will be in the next report.

### Recommendations

Recommendations for bait selection until strychnine levels can be guaranteed to the field.

1. The preferred bait from the analysis is the oat groat with Karo syrup, overall this bait performed the highest of the baits tested.
2. We need the use of the oat groat in the burrow builder to improve the control in this operations. This bait would be very effective if used in the burrow builder and there would be no problem with application through the machine.
3. Testing of levels of strychnine should be continued until we solve the problems of variability and can guarantee toxin levels to the field.
4. We should reinforce the need for research on efficacy and palatability of the bait for better control.
5. We should stress minimum movement of bait from manufacturer to the burrow system; this is a must to reduce the resulting lower toxicity of the bait. This recommendation should be incorporated in all pocket gopher control projects to minimize bait movement to the maximum.

Complete study is attached to Appendix E.

## VI. HAND CONTROL DATA

A. We are currently investing approximately \$166.00/acre in plantation site preparation, planting stock, and planting costs. This amounts to \$0.24/tree planted if 681 trees are planted per acre. The cost of pocket gopher control during 1976 averaged \$12.97/acre for all types of treatment or \$0.02/tree when 681 trees are planted per acre. Based on Arthur Allen's mortality figures, the value of trees lost to pocket gophers per acre based on the cost of establishment of the trees is \$32.11/acre in untreated areas and \$10.22/acre in treated areas. The benefit cost ratio for treatment is 1.69:1.

B. Arthur Allen established two study areas on the Ashton District and This is what he reports: "Overall survival after 27 months in the treated plot was found to be 80.4 percent as compared to a 50.4 percent of seedlings without pocket gopher control procedures. Disregarding seedlings lost as a result of non-gopher related mortality, tree losses resulting from gopher activity accounted for a 57.8 percent loss in the control plot and a 2.5 percent loss in the treated plot.

C. The evaluation of our rodent control practices on the Ashton District is very close to the same figures that Arthur Allen's independent studies show. Using the guidelines given in this report and recognizing every area has special problems that can be solved by trying different methods, organizations can put together a rodent control program that will definitely increase the survival of our plantations. Our goal is not to eliminate the pocket gopher, but to keep his damage to our plantations at an acceptable level for good forest management of all resources.

## VII. BURROW BUILDER

### Technical Specifications

The burrow builders used on the Ashton District were constructed by: Ghormley Mechanical Industries of Ashton, Idaho, and by Schneidmiller Industries of Fort Collins, Colorado. These machines are basically the same, i.e. large heavy shank with a torpedo attached to the bottom to go through the ground at a depth of 6 to 12 inches, and a mechanically fed grain applicator dropping a small amount of grain every few feet, and packer wheels to close the burrow. There are different makes of grain cannisters and feed works. We are using the John Deere corn cannister on the Ashton machines. There is a feed plate in the bottom of the cannister and the trials on this District have found that three slots 1/2-inch by 1-1/2 inch ground out of the feed plated with the burrows being spaced 15 to 25 feet apart will apply from 1.5 to 2 pounds of poison oats per acre, which seems to give good control of the pocket gopher.

We have constructed a two wheel carrier that can be pulled behind a wheel tractor or a crawler type tractor. It tkes a remote hydraulic cylinder with eight feet of hose to raise and lower it in and out of the ground.



It has sloping axles to help in crossing logs, debris, or rocks and the burrow builder mounted on the carrier gives a better overall constructed burrow and better control of the pocket gopher.

Technical specifications of the burrow builder carrier can be obtained from the Ashton District Office. We have tried the burrow builder mounted on wheel tractors, crawlers, and mounted on the carrier behind wheel tractors and crawlers, and in our conditions, for overall control the crawler tractor in the 50 horsepower range pulling the carrier mounted burrow builder does the best job.

The Missoula Development Section has developed blueprints for the burrow builder. Plans are available from them.

Following is a list of modifications that have been made to the burrow builder and its carrier:

a. The main frame of the carrier was reinforced and boxed in with heavy angle iron.

b. The knife type piece of steel mounted directly ahead of the main burrow builder shank on the carrier was designed and installed. This modification greatly increases the percentage of good burrow made by the burrow builder. It was installed with two shear bolts and raises and lowers at the same time the burrow builder goes in or comes out of the ground. It is made of abrasion resistant steel 1/4 inch thick, 14 inches deep and 10 inches wide, with a round sharpened edge on the front. It can be taken off easily and sharpened and it cuts small roots, brush and debris that normally pulls in front of the main shank on the burrow builder when it is pulled through lodgepole pine clearcuts. In sod areas where the shank of the burrow builder normally tears the sod, this will cut and let the shank slip through. As the packer wheel closes the ground back over the burrow, it is sometimes hard to tell where the cut was made. We have used this in stumps, brush, rocky areas, steep slopes, sod and through slash piles and it is doing acceptable work.

c. The chain drive from the packer wheel to the cannister was enclosed in a metal guard after we had trouble breaking the shaft that drives the cannister. This modification greatly increased the turning of the packer wheel and thus, we have a much more even distribution of the poison grain in the burrow.

d. A support bearing was installed on the right side of the drive shaft that turns the feeding mechanism which stopped the breakage of the drive shaft. We are using a speed chain drive for dependable turning of the feeding mechanism.

e. Larger bearings with dirt covers were installed on the packer wheels and the frame to hold the packer wheel was reinforced.

f. We installed braces to hold the cannister in place on the burrow builder; this consists of braces attached to the main frame of the burrow builder and bolted to a round bracket installed on the cannister. Two rubber tie down bands are used to hold the lid on the cannister.

g. A point was installed on the bottom front of the main shank to help keep the shank in the ground. This point is a triangle shaped wedge six inches long and five inches high, one inch thick, and is heavily hard surfaced to reduce wear. This point will keep the shank in the ground in all but the severest of conditions.

h. The torpedo on the bottom of the main shank was cut away from the slot running along the bottom of the torpedo on a 45 degree angle. It was polished with a hand grinder and this has greatly reduced the plugging with dirt of the slot that lets the grain into the bottom of the constructed burrow. The operator reports that usually the only time the slot plugs with dirt now is when the machine is backed up with the torpedo in the ground.

f. At the present time, we are using truck tire inner tube pieces of rubber to run from the main frame of the burrow builder to the frame of the carrier. This lets the burrow builder turn on the carrier when rocks or stumps are hit when moving through the ground. We have tried all types of springs but they would not last over one day. We will try different methods next summer to solve this problem.

j. The single packer wheel was reinforced with round pieces of 3/16-inch metal being welded on the outside edge.

The summer of 1977 was a good trial for the burrow builder. After the modifications had been made, it performed exceptionally well in rocky soils, in brush, sod, slash piles, debris, and on steep slopes. In the late fall after the sod was frozen to a depth of one to two inches, the knife would cut the sod and the main shank would slide through and the packer wheel would cover the cut, making it hard to tell where the burrow was.

We have noticed that the gopher immediately moves into the artificially constructed burrow and repairs it which leads us to believe he picks the grain up and stores it in his food cache.

We have used the caterpillar pulling the carrier mounted burrow builder on slopes in excess of 35 degrees with little difficulty.

#### Control Evaluation

Pursuant to Clause 1, of Form AD-837, the Government will inspect the blocks to determine the quality and acceptance of the work. The inspector will check enough of the burrow builder operation to meet the requirements of spacing, 50 percent sound burrow, plus the proper amount of poison grain drops over the entire block. This will be done by the



inspector taking 1/100 acre plots (radius 11.78 feet) randomly throughout the blocks. One plot per two acres will be taken, and the information recorded on the Forest Service burrow builder inspection plot sheet.

The open hole procedure can be used to evaluate the burrow builder effectiveness. The population of a given area can be established by using the open hole procedure before treating and after treatment, the establishing of more open holes will give an indication of the effectiveness of treatment. With our experience, we recommend an application of 1.5 to 2 pounds per acre of .5% strychnine alkaloid treated oats. Two burrows constructed closely together around the perimeter of an area will also give help in keeping reinvasion to a minimum. We feel a preplant treatment in areas of heavy gopher infestation in the fall before planting with the burrow builder and then good hand control for two summers, we can establish and give our plantations a good start. The areas will have to be surveyed yearly and monitored for reinvasion and prompt treatment if reinvasion occurs, but we can protect our plantations with good rodent control practices.

ALLEN, ARTHUR, 1974, 1975, 1976. Evaluation of Pocket Gopher Control on the Ashton District.

ARNES, V.G., 1970. Open Hole Technique.

CANUTT, PAUL R., 1969. Development and Operation of the Forest Land Burrow Builder.

Ashton District Annual Report, 1975, 1976, 1977.

MILLER, RICHENS, BARNES, Open Hole Technique.

McARTHUR, WILLIAM L., Review and Analysis of Northern Rocky Mountain Pocket Gopher Control on the Ashton Ranger District, 1977.



## EXHIBITS

Exhibit A	Survey Forms, Annual and Four Year
Exhibit B	Training Agenda
Exhibit C	Forms Used
Exhibit D	Work Plans
Exhibit E	Bait Study
Exhibit F	Safety
Exhibit G	Spade Tile Shovel Diagram
Exhibit H	Hours of Work Justification
Exhibit F	Crew Procedures Chart
Exhibit G	Simulated Gopher Systems
Exhibit H	EA Chart

EXHIBIT A

# POCKET GOPHER SURVEY

Area \_\_\_\_\_ Comp Number \_\_\_\_\_ Block Number \_\_\_\_\_ Date \_\_\_\_\_

## ACTIVITY RECORD

Plot No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Light															
Medium															
Heavy															

Remarks:

Area \_\_\_\_\_ Comp Number \_\_\_\_\_ Block Number \_\_\_\_\_ Date \_\_\_\_\_

Plot No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Light															
Medium															
Heavy															

Remarks:



## ANNUAL FALL RODENT SURVEY

[illegible]

TARGHEE NATIONAL FOREST

RODENT CONTROL TRAINING SESSION

July 28, 1984

Ashton Work Center

AGENDA

I. Introduction and overview of problems.

II. Slide Presentation

a. Gopherology, Damage, & Control

BREAK!!

III. Types and control measures.

IV. Contract Administration

V. Safety

LUNCH !!!

VI. Field Trip

1 - Dig gopher system

2 - Inspection Procedures

3 - Inspection Plot

4 - Open Holes

## RODENT CONTROL INSPECTION SHEET

CONTRACT # \_\_\_\_\_ INSPECTOR \_\_\_\_\_ PLOT SIZE & RADIUS \_\_\_\_\_

[illegible]

REFER TO CONTRACT FOR DEFINITIONS



## EXHIBIT

RODENT CONTROL INSPECTIONSAFETY, GRAIN CARE AND HANDLING COMPLIANCE

FOREST \_\_\_\_\_ DISTRICT \_\_\_\_\_ DATE \_\_\_\_\_  
 COR \_\_\_\_\_ INSPECTOR \_\_\_\_\_ CONTRACTOR \_\_\_\_\_  
 UNIT \_\_\_\_\_ BLOCK NO. \_\_\_\_\_ CONTRACT NO. \_\_\_\_\_

WEATHER CONDITIONS

TIME	TEMPERATURE	WIND VELOCITY	WIND DIRECTION
a.m.			
p.m.			

ITEM	SATISFACTORY	UNSATISFACTORY
Spilled grain in treatment area. Remarks - if unsatisfactory, give reason:		
Coveralls, respirator and gloves being used to dispense bait. Remarks:		
Water, soap and salt tablets available daily at work site, workers washing twice daily. Remarks:		

DAILY PROGRESS REPORT

Bait used today \_\_\_\_\_ lbs. Total in block \_\_\_\_\_ - \_\_\_\_\_ lbs.  
 Acres treated today \_\_\_\_\_ acres  
 Number in crew today \_\_\_\_\_

OPEN HOLE RODENT CONTROL APPRAISAL

BID. ITEM \_\_\_\_\_ BLOCK NO. \_\_\_\_\_ ACRES \_\_\_\_\_ LOCATION \_\_\_\_\_

CONTRACTOR \_\_\_\_\_ HAND TREAT \_\_\_\_\_ BURROW BUILDER \_\_\_\_\_

NAME OF INSPECTOR \_\_\_\_\_ DATE PLOTS ESTABLISHED \_\_\_\_\_

DATE HOLES OPENED \_\_\_\_\_ \*DATE HOLES CHECKED \_\_\_\_\_

\*Note: On this date take down the "Poison Grain Warning Signs".

INSPECTION DATES

Indicate Condition    O=Open    C=Closed

Plot No.	Open	Closed	REMARKS: New Activity, Light, Medium, Heavy..Gophers fo
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Total Open = \_\_\_\_\_

Total Closed = + \_\_\_\_\_

TOTAL \_\_\_\_\_

Indicated % Control = \_\_\_\_\_

(Open + Total)

NOTE: Establish plots immediately to control.

Open hole (plots) 20 to 24 d

Read plots 24 to 48 hours aft opening.





## RODENT CONTROL WORK PLANS

- Jan. 1 - 1. Contracts are in and advertized.
- Feb. 2 - 2. Poison bait is ordered; pesticide building cleaned and ready.
- July 1st week - 3. Training program will be given District inspectors ( 1 day session to include contract and field work) (slide presentation in a.m.)
- June 4 - 4. During the last of the planting contracts we will monitor the planted areas for pocket gopher activity.
- July 1-5 - 5. When ground is drying and push piles area evident we will give a start work order and proceed with the training session which will be approximately 7/1/84.
- June 20-30 - 6. Vehicles and contract assignments will be given prior to 7/1/84.
- July - 7. Poison bait containers will be filled and contractors invited to fill their poison jugs the day before contract starts.
- July - 8. Contracts starting will be staggered so we may help each contractor to be able to meet the contract specifications.
- July - 9. Inspector will pick up bait the night before contract starts and each afternoon and then proceed to the job site in the a.m. so he can arrive there to meet contract crews.
- July - 10. Inspector and COR will work with each crew to get contract compliance as soon as possible.
- August - 11. Open hole sites will be established as contract proceeds, and read two weeks after being opened.
- August - 12. As contractors finish inspectors will clean up and put away equipment then be returned for other assignments.
- 13. Safety meetings will be held and documented with a safety attitude being stressed all thru the contract and open hole time.

TARGHEE NATIONAL FOREST

ASHTON RANGER DISTRICT

BAIT ANALYSIS FOR CONTROL OF THE ROCKY MTN. POCKET GOPHER

FY 1986

ABSTRACT

Reduced success of the contract baiting program for control of the Rocky Mtn. Pocket Gopher (*Thomomys talpoides*) monitored on the Ashton District indicated a need for analyzing all aspects of this project. In evaluating this project the bait used for control was recognized as a starting point for monitoring of the whole contract baiting project with a need for good documentation of each phase. This report explains the five different gopher baits that were used on the Ashton District during the summer of 1986, (1)Standard Bait, (2)Orco, (3)Oat Groat, (4)Rhoplex, (5)Milo.

I-TYPES OF BAIT ANALYZED

1.STANDARD-The formulation for this bait was a #1 Otana oat that had been cleaned twice by commercial means and once by the Pocatello Supply Depot; sugar beet syrup with the regular formulation being used and manufactured by the PSD in May of 1986. (PSD stands for Pocatello Supply Depot).

2.ORCO-A commercial pelleted bait formulation using alfalfa leaves and carrots with a 0.5% strychnine being applied. This bait was manufactured in Eugene, Oregon. Two shipments of Orco bait were received in Ashton, one on May 1, 1986 and the other on July 1 1986.

3.OAT GROAT WITH KARO SYRUP-The groat bait is an oat with the hull being removed and the kernel being lightly crimped. Karo syrup was substituted for beet molasses and the remaining ingredients are the same as the regular formulation with 0.5% strychnine being applied, it was manufactured at the PSD in May 1986.

4.RHOPLEX-This bait is for use in the burrow builder. The Otana oats were cleaned three times and the regular formulation without the syrup is used. This bait was manufactured at the PSD in May of 1986.

5.MILO-A commercial bait manufactured in California using Milo grain as the base. The Milo is dyed green and the label indicates a strychnine level of .35% has been applied. This bait was not field tested in 1986. (Milo samples were taken from the manufacturer's container).

## RODENT SAFETY CONTROL

### Objective

To make all involved persons aware of potential dangers and to become safety conscious; to become personally involved with safety and to have no lost time accidents or vehicle damage, other than normal wear; to help individuals become aware of FSH 6707.11 (Health and Safety Code Handbook).

### Organization

#### A. Project Leader - Lowell Birch

##### 1. Rodent Control Foreman

- a. Rodent Control Inspectors - 5 with vehicles
- b. Contract Crew

### Performance

To help people maintain a safety conscious attitude at all times, recognizing that safety must not suffer in the interest of time. Unsafe acts will not be tolerated.

### Accident Reporting

All accidents will be reported verbally and documented by an accident report. All near misses will be reported verbally and entered in diary. Both of the above will be reviewed at safety meetings weekly. Rodent control foreman will discuss weekly with each inspector all safety problems and document the results of such a meeting. Cor will help with the paper work if accidents or near misses do happen. Vehicle accidents will be reported on the AD-112 form and personal injury on the CA-1.

### Hazards and Risks - By Priorities

#### A. Driving

- 1. Practice defensive driving at all times.
- 2. When driving before daylight, the maximum speed will be 35 mph with lights on.
- 3. Check accessories.
- 4. Check mud holes for hidden objects.
- 5. Drive at a safe speed for road conditions.



6. Chain up before you get stuck.
7. Check before backing up for stumps, logs, and other vehicles.
8. Observe Forest rule of driving with lights on.

B. Handyman Jack

1. Firm footing.
2. Carry short plank or heavy plywood square.
3. Check jack for serviceability (weekly) and place in jack sack.

C. Footing

1. Watch footing for sticks, holes, logs, etc., in the field.
2. Be aware of dew and moist conditions in the early morning hours.

D. Tools

1. Keep plots well away from treaters.
2. Carry sharp tools in a position so you can't fall on them.
3. Don't throw tools.

E. Clothing

1. All people equipped with adequate clothing and footgear so as to be protected from all types of weather.
2. Observe all pesticide regulations for clothing.

F. Insect Repellant

1. Use sparingly
2. Keep away from eyes and mouth, also plastic items.

G. Care of Vehicles

1. Keep coolant and oil levels checked.
2. Keep items off floors and seats.
3. Check air cleaner weekly.
4. Service and wash as needed.
5. Observe Forest circle of safety before driving any vehicle.

#### H. Parking

1. Park well away from Contractor's vehicles and work area.

#### I. Backing

1. Use caution when backing and turning around in clearcuts, timber, etc.

2. When possible, have coworker guide in backing vehicle.

#### J. Contractor

1. Inform contractor or his foreman of unsafe practices of his employees.

#### K. Filling Jugs With Poisoned Bait

1. Use proper clothing and wear a mask.

2. Be acquainted with proper procedure for poisoning symptoms.

3. Read and study the information obtained from Dr. Kruegar. This information is in contract folder.

#### L. Weather

1. Be equipped with adequate clothing and foot gear to be protected from all weather conditions.

## SAFETY NOTES ON STRYCHNINE ALKALOID POISONING

### Detailed Information Obtained from Dr. A. A. Krueger References

#### Toxicology

After ingestion of strychnine, symptoms commonly begin with 10 to 30 minutes. Often without warning of any kind, the patient falls in a violent convulsion. Spasm of all skeletal muscles, then muscles that stop respiration. The drug apparently acts similarly on all portions of the central and peripheral nervous systems to increase excitability.

Methocarbomal, curariform drugs such as succinylcholine, and barbiturates can be used as muscle relaxants, etc., by a doctor to help the victim of strychnine alkaloid poisoning.

#### Symptomatology

1. Restlessness, apprehension, heightened acuity of perception (heaving, vision, feeling, etc.), abrupt movements, hyperreflexia, and especially muscular stiffness of the face and legs occurs. Rarely does vomiting occur.
2. Convulsions -- one or more. Consciousness is retained during the convulsion, which is painful, and the patient remains apprehensive and fearful throughout the illness.
3. Between convulsions, muscular relaxation is typically complete. Breathing resumes. Cold perspiration covers the skin. Dilated pupils may contract.

#### Treatment

1. Treatment is designed primarily to prevent convulsions and thus to protect medullary centers from excessive stimulation and from anoxia.
2. Ingestion of a slurry of 6 to 8 heaping teaspoonsful of activated charcoal in a few ounces of water is desirable if done before the development of reflex hyperexcitability.
3. Keep victim comfortably warm, quiet and in darkened place or room. Exclude all visitors as each succeeding convulsion reduces his chances of survival.



### S.A.P. Information Summary

1. Strychnine alkaloid has an extremely bitter taste to humans.
2. The poisoning action is entirely against the nervous system.
3. The symptoms are convulsions that lead to respiratory arrest.
4. Treatments that will help are: (a) Salt water solution to induce vomiting only to be used before the convulsive stage; (b) sodium pentobarbital and sodium amytal given immediately will reduce the severity of convulsions; and (c) emetics, such as 1-2% tannic acid are useful but should only be used after the convulsive stage is past.

### Estimated Lethal Dose in Humans -- Examples

110 lb. female -- 50 KG

150 lb. male -- 68 KG

(2.205 lb./KG)

MG Strychnine to kill -- LD

Female -- 75 (.03 lb./dust) or .529 oz.

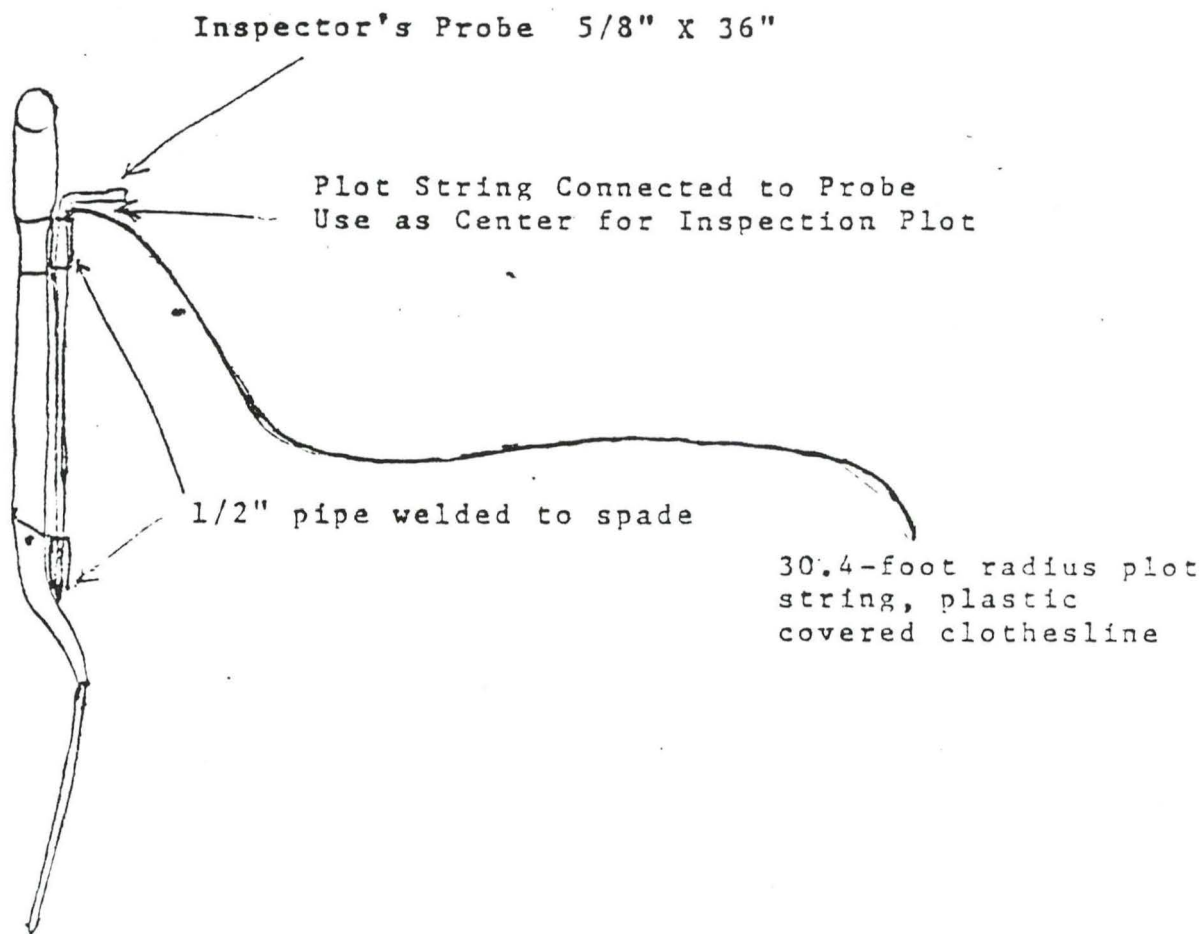
Male -- 102 (.045 lb./dust) or .72 oz.

SALT LAKE CITY POISON CONTROL CENTER - 801-581-2151

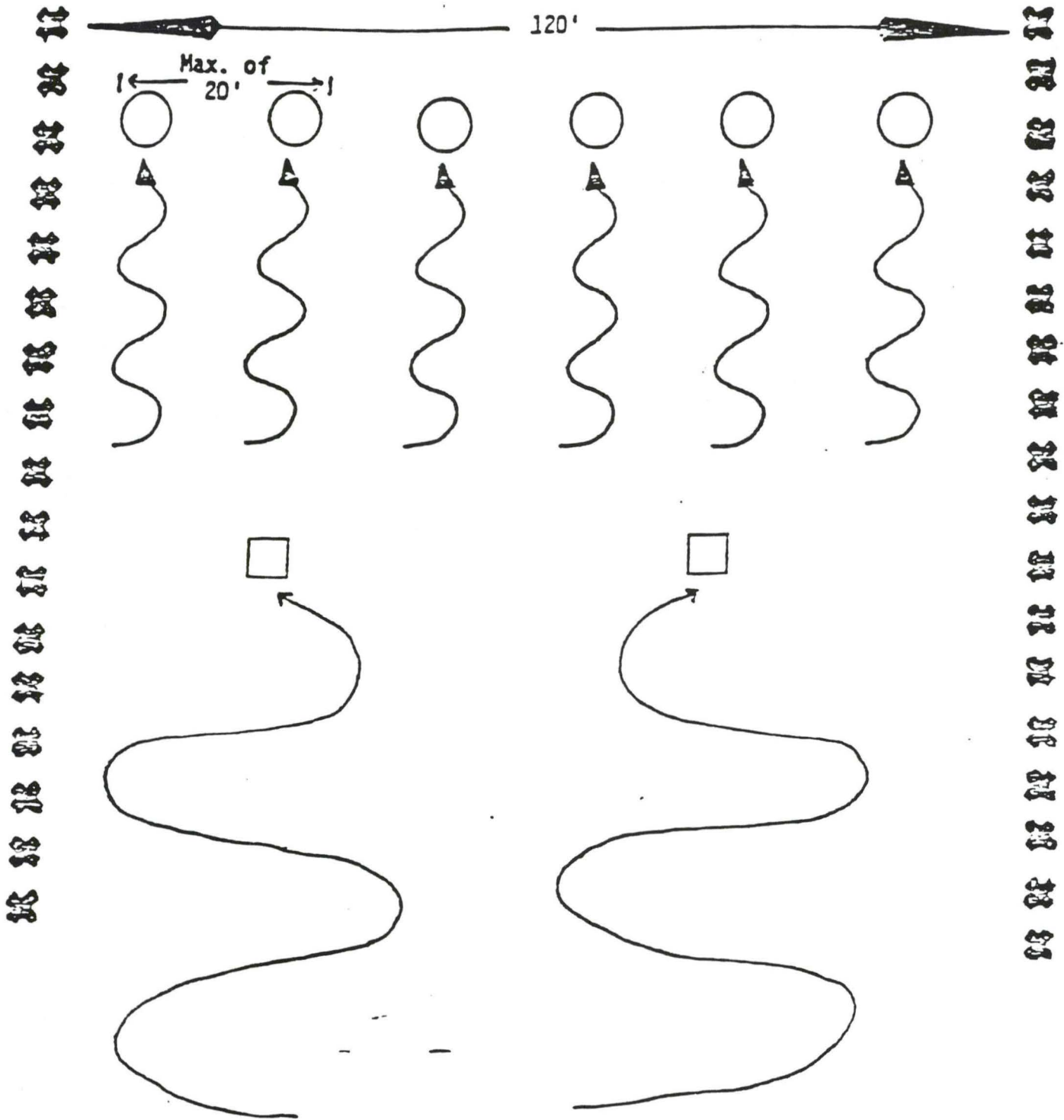
They suggested we use activated charcoal to induce vomiting if we knew an employee had swallowed some of the poisoned oats. Put ear muffs on the victim's ears and complete darkness to reduce the chance of convulsions. They will need to be transported to medical facilities very, very carefully.





EXHIBIT

SPADE, PROBE AND PLOT STRING DIAGRAM



Inspector's Tile Spade



-  Contractor Ribbon Line
-  Crewman
-  Checker
-  Direction of Travel



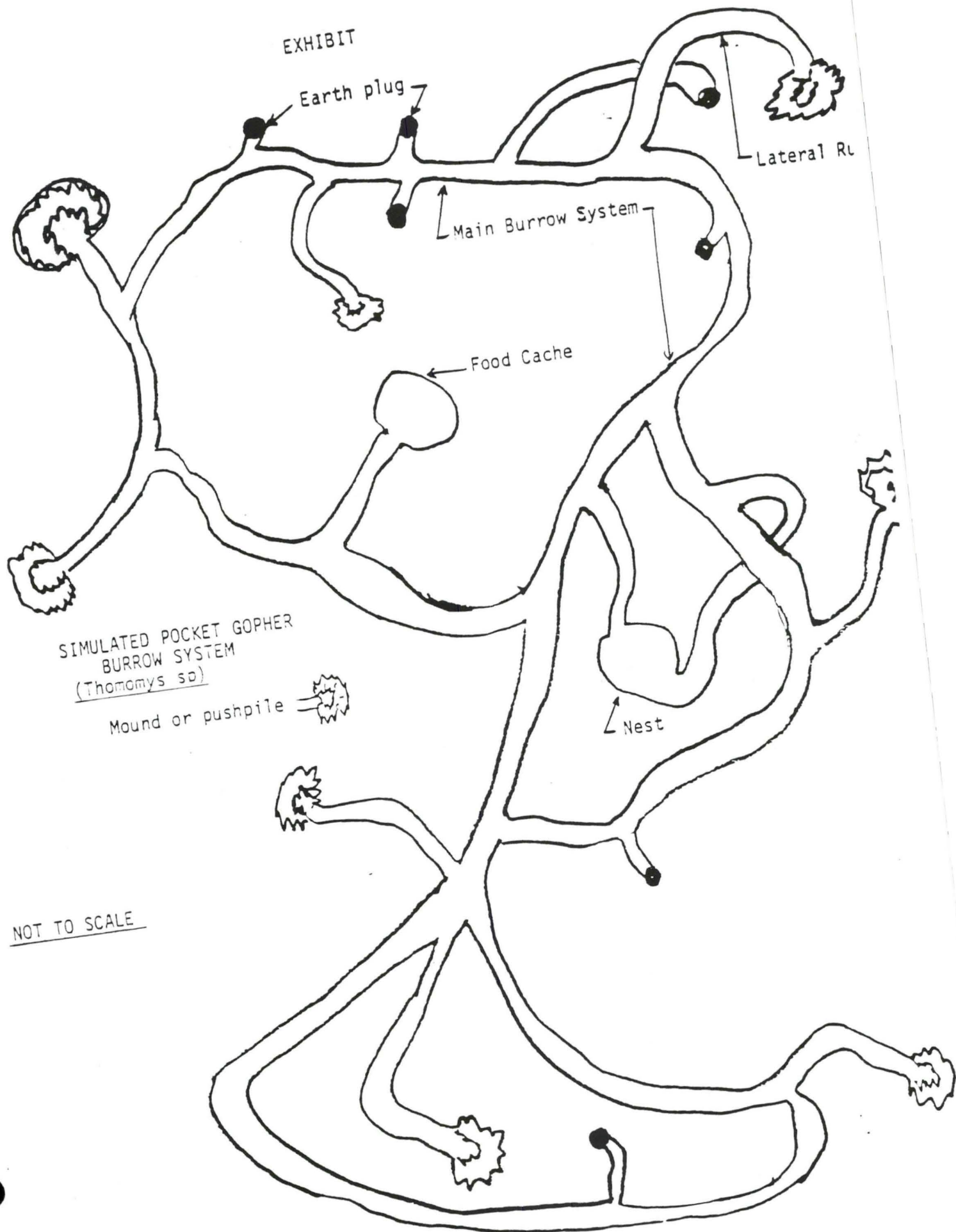
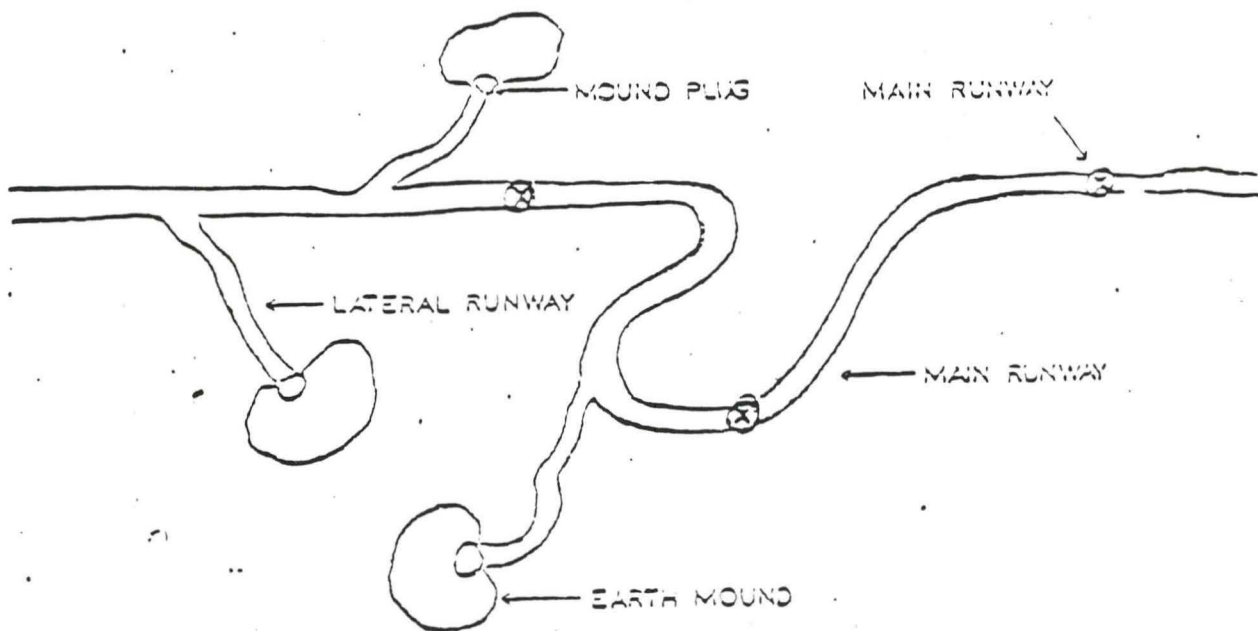


EXHIBIT 1

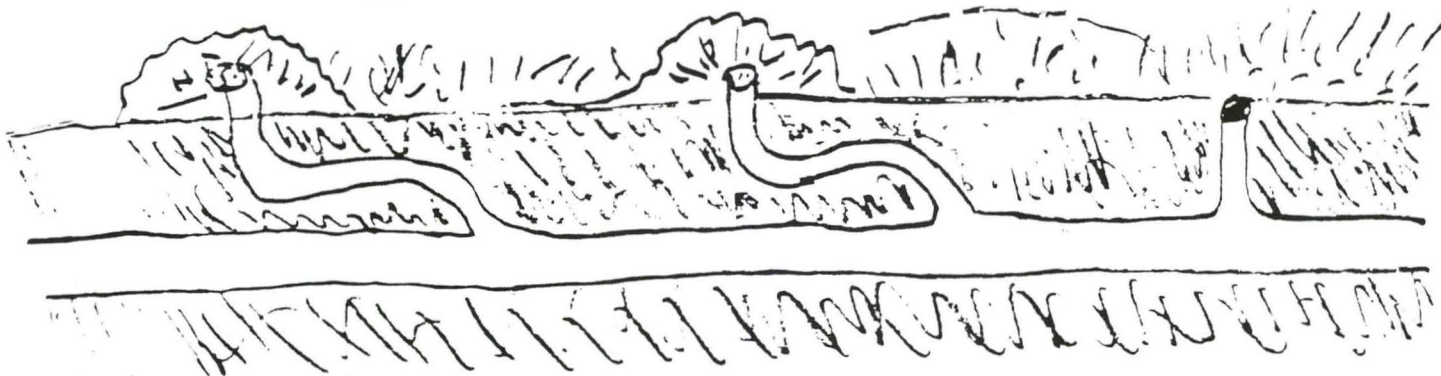
The following diagrams illustrate the location of lateral and main runways in relation to earth mounds, mound plugs and main runway plugs. Knowledge of these burrow characteristics is necessary for efficient and accurate bait placement



(X) Correct Bait Placement or "Set"

EARTH MOUND

EARTH PLUG



THE WRITING OF EA'S  
WILL FOLLOW THIS OUTLINE  
(CEQ format §1502.10 - 1502.18)

SECTIONS OF OUTLINE	NEEDED IN EA 1/
Outside cover	Optional
Cover sheet	Optional
Summary sheet	Optional (desirable if lengthy EA)
Table of contents	Optional
Purpose of and need for action	Required
Alternatives, including proposed action	Required
Affected environment	Required
Environmental consequences	Required
List of preparers	*- <del>Optional</del> -* <i>REQUIRED</i>
List of agencies, organizations, and persons to whom copies of the Statement are sent	*- Optional -*
Index	Optional
Appendix	Optional

/ The length and detail of analysis and the degree of documentation varies according to the type of decisions being made, and is determined by the official responsible for the decision(s). (See FSM 1950.3.)